FINAL SUMMARY OF FIELD DATA VERIFICATION RESULTS FOR PROPERTIES INSPECTED IN 2008

FOR THE

TROY ASBESTOS PROPERTY EVALUATION PROJECT

**Troy Operable Unit Number 7
of the Libby Asbestos Superfund Site**

March 2009

Prepared for:

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Task Order Number 20

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1.0   INTRODUCTION

The purpose of this report is to present the results of Tetra Tech EM Inc.'s (Tetra Tech) efforts to verify the accuracy and completeness of Troy Asbestos Property Evaluation (TAPE) field documentation collected and recorded during the 2008 field inspection season performed in Troy, Montana. Verification efforts were conducted in accordance with Version 2.0 of the *Data Management Plan for the Troy Asbestos Property Evaluation Project* (DMP) (Tetra Tech 2009).

1.1   BACKGROUND

TAPE field documentation includes all data compiled and recorded on field forms, on GeoXT handheld computers, and in photographs taken during property assessments conducted during the TAPE inspection. Access agreements, logbook entries, property sketches, and point of contact (POC) forms were scanned to portable document format (PDF) files and, together with digital photographs, were compiled in the electronic data archive. All information entered on the GeoXT handheld computers in the field was downloaded to the Troy Scribe database (Scribe database).

Verification of field documentation was done to ensure, to the greatest extent possible, that all necessary information was entered completely and accurately into logbooks and handheld computers; that photographs were correctly and adequately cataloged; and that no discrepancies exist amongst these various records as documented in the Scribe database and electronic data archive for each property.

As part of the verification process, resolution of field documentation issues was done to rectify inaccuracies and discrepancies, so that the final record for each property is as accurate and complete as possible. In most cases, resolution required correction of discrepancies by updating the Scribe database or by adding comments to scanned field documents such as logbook entries and property sketches. In some cases, it was necessary to consult with field crews and the Montana DEQ, or to conduct follow-up site visits, to obtain missing information and/or rectify discrepancies.

2.0   DESCRIPTION OF VERIFICATION ACTIVITIES

The verification process was two tiered. The tiers are referred to as Category 1 and Category 2 verification. These verification tiers were primarily designed to eliminate incorrect (in particular, false negative) determinations of visible-vermiculite (VV) from both the interior and exterior record, as well as to ensure the highest level of accuracy of the information recorded in the Scribe database and electronic data archives.

The scope and steps of Category 1 and Category 2 verification are described in Sections 2.1 and 2.2, respectively.

2.1   CATEGORY 1 VERIFICATION

Category 1 verifications identify inconsistencies within the Scribe database. Category 1 was conducted on 100 percent of the data generated during the 2008 TAPE field season. The process involved two general types of queries of the Scribe database; global queries and relational queries. Global queries were conducted first, followed by relational queries.

Global queries were done sequentially, so that the broader-based discrepancies were eliminated first. Example global query topics include: (1) identification of blank fields, (2) identification of missing Troy TAPE (TT) or use area (UA) numbers, and (3) identification of obvious errors, such as the area of a primary residence listed as 50 square feet.

After the global queries were run and identified issues resolved, the relational queries were conducted. Relational queries were also completed on 100 percent of the field data for all properties investigated during the 2008 TAPE field season. Similar to the global query process, relational queries were completed sequentially with discrepancies being resolved before moving on to subsequent queries. Example relational queries include:

- The land use description must correspond appropriately to the land use category. For example, if the land use description is "C - Decorative Gravel/Rock," the land use category should be "Common Use Areas."

- If the value in the database for "DOES THE INTERIOR HAVE VERMICULITE ATTIC INSULATION?" is "*No attic*," then the value in the database for "EXTENT OF FINISHING IN THE ATTIC AREA?" should be "*No attic.*"

The Scribe Database Administrator (database administrator) ran the global and relational queries and designated a Data Verification Analyst (verification analyst) to resolve any issues found. The verification analyst documented how to resolve each issue in a modification tracking (ModTrack) form. This form is an Excel spreadsheet that allowed the verification analyst to record and track the necessary changes by identifying specific items requiring resolution and the corresponding modification. The database administrator compiled each of the ModTrack Excel files from the verification analysts into a master ModTrack Access database file as a record of the recorded changes. The database administrator then made the corrections to the database as indicated in the ModTrack forms.

2.2   CATEGORY 2 VERIFICATION

Category 2 verification identifies errors with the written documentation (logbook entries, sketches, and photos) as well as a search for inconstancies between Scribe and written documentation. Category 2 verification was completed on 100 percent of the properties inspected during the 2008 TAPE field season. The properties verified were inclusive of properties reviewed during the Category 1 verification process.

Category 2 verification entailed cross-checking data contained in the Scribe database with the various documents contained in the electronic data archives. Category 2 verification required access to the following information sources:

- **Internal TAPE Web Portal.**   This contained the verification checklist, which listed all of the 2008 parcels for Category 2 verification, and on which the verification analysts documented verification details (for example, verification dates, issues identified, how issues were resolved).

- **Scribe database.** This contained the most recent Troy Scribe database.

- **Electronic Data Archive.** This contained all of the scanned field documents such as logbook entries, property sketches, digital photographs, and response documentation.

- **TAPE Reports (Access database)**. This displayed a verification report for each parcel from the Scribe database.

Upon review and verification of all field information for a given parcel, the verification analyst recorded findings for the parcel on the verification checklist on the internal TAPE web portal. The verification analyst then recorded any changes to be made to the Scribe database in a ModTrack form and posted it on the internal TAPE web portal so that the database administrator could make the necessary changes.

Resolution of issues identified through verification sometimes required modifications to the Scribe database and/or the electronic data archives. Modifications to the Scribe database were performed by the database administrator based on the information presented in the ModTrack forms. Modifications to the electronic data archives were done by the verification analyst by adding electronic comments to the affected PDF files such that the original document was not altered, but the modifications were clearly indicated in comments that could be viewed in both the electronic file and on a hard copy printout of the file. Verification analysts made these modifications directly to the associated PDF documents and coordinated updates to the master archive with the Electronic Data Archive Coordinator (data archive coordinator).

The verification team also tracked individual Category 1 and Category 2 errors. These errors were assigned to various groupings. For example, errors that may result in a "clean" (no cleanup required) parcel becoming a "dirty" (cleanup required) parcel were grouped together. Errors were tracked in order to (1) provide an analysis of the percentage of errors, such that the overall percentage of properties being evaluated under Category 2 verification could be adjusted, if necessary, and (2) provide information that could be used to adjust field documentation procedures in the future, if necessary.

3.0 SUMMARY AND FINDINGS

A total of 262 parcels with 1,665 locations (UA and buildings [BD]) were inspected during the 2008 field season. In addition, 1,988 samples were collected from these parcels.

3.1 CATEGORY 1 VERIFICATION

Category 1 verification entailed running a variety of global and relational queries in the Scribe database. In addition to the queries, filters and sorting were used to search for incomplete and/or inaccurate data entries.

The Category 1 verification efforts resulted in a number of formatting and procedural modifications as well as error corrections to the Scribe database. An example of a formatting modification is where the entry for "HadInteriorAtticInsulation" was changed from "NA" to "NA (if attic currently has VCI)". An example of a procedural modification is a blank field that was modified with an "NA" entry. A total of 35 ModTrack changes were made to the Scribe database as a result of Category 1 verification efforts. A total of 29 parcels, 35 locations, and 12 samples were affected.

Generally, any error requiring modification to a VV count field was considered to be critical, because of its potential to affect remediation decisions. To identify critical errors, the criteria in Table 2 of the DMP (Tetra Tech 2009) were used to separate critical errors from less critical procedural and formatting errors. Additional verification (for example, more in-depth queries) was performed on locations found to have critical errors.

Table 1 summarizes Category 1 verification results for locations. Table 2 summarizes Category 1 verification results for samples.

TABLE 1
CATEGORY 1 VERIFICATION RESULTS FOR LOCATIONS

Query Type/Name	Number of Parcels [a]	Percent of Total Parcels [b]	Number of Locations [c]	Percent of Total Locations [d]
Data check query	2	0.8	2	0.1
IndoorAtticRelation	1	0.4	1	0.1
Parcel Inspection	1	0.4	1	0.1
qVV_Less30_exp	12	4.6	13	0.8
Training QA/QC	1	0.4	4	0.2
Verification	1	0.4	1	0.1
VV Reinspection	3	1.1	3	0.2

Notes:

[a]   Number of parcels modified as a result of the query.
[b]   Percentage of parcels modified as a result of the query: 262 total parcels were inspected in 2008.
[c]   Number of locations (buildings and use areas) modified as a result of the query.
[d]   Percentage of total locations (buildings and use areas) modified as a result of the query: 1,665 total locations were inspected in 2008.

TABLE 2
CATEGORY 1 VERIFICATION RESULTS FOR SAMPLES

Query Type/Name	Number of Parcels [a]	Percent of Total Parcels [b]	Number of Samples [c]	Percent of Total Samples [d]
Location Query	11	4.2	11	0.6
Parcel Check Query	1	0.4	1	0.1
qSoil_Samples_Interior	1	0.4	1	0.1

Notes:

[a]   Number of parcels modified as a result of the query.
[b]   Percentage of parcels modified as a result of the query: 262 total parcels were inspected in 2008.
[c]   Number of locations (buildings and use areas) modified as a result of the query.
[d]   Percentage of total locations (buildings and use areas) modified as a result of the query: 1,665 total locations were inspected in 2008.

3.2   CATEGORY 2 VERIFICATION

Primary elements of 262 parcels inspected in 2008 underwent Category 2 verification. Issues identified during Category 2 verification are currently being addressed; resolution of these issues and their incorporation into the data record will be complete by the beginning of the 2009 field season.

Tables 3 and 4 present breakdowns of the error counts by field and percent of errors in the verified parcels resulting from the Category 2 verification efforts. Table 3 includes only errors that have the potential to affect whether the location meets current removal criteria; in other words, that may affect remediation decisions. For example, visible vermiculite counts changed from 5 Low and 1 Intermediate to 6 Low and 0 Intermediate in one instance. Some of the errors summarized in Table 3 may also be categorized as critical errors. Those critical errors were factored into the critical error percentages as well. Table 4 includes only errors that lack the potential to affect whether the location meets current removal criteria; in other words, that may not affect remediation decisions.

A total of 100 ModTrack changes were made to the Scribe database as a result of Category 2 verification efforts. A total of 52 parcels, 68 locations, and 9 samples were affected.

In addition to the errors identified in the Scribe database, errors were identified in various documents included in the electronic data archive. Documents, such as property sketches, were modified via electronic notes using Adobe Acrobat software to preserve the original document and display the modification comments. Also, if the electronic data archive was found to be missing electronic documents or photos, the files were located in the Troy field office files, scanned, and added to the electronic data archive.

TABLE 3
CATEGORY 2 VERIFICATION ERRORS THAT MAY AFFECT WHETHER A LOCATION MEETS CURRENT REMOVAL CRITERIA

Error Description Modification	Number of Affected Verified Parcels	Percent of Verified Parcels	Number of Affected Verified Locations	Percent of Verified Locations
Location name	4	1.5	4	0.2
Use area type (e.g., limited use area changes to specific use area)	4	1.5	4	0.2
Visible vermiculite counts (e.g., 5 Low, 1 Intermediate changes to 6 Low, 0 Intermediate)	5	1.9	7	0.4
Currently has vermiculite containing insulation in attic (e.g., Unknown Changes to No Attic)	30	11.5	41	2.5
Location of indoor vermiculite (not including attic) (e.g., Ceiling changes to Floor)	0	0	0	0

TABLE 4
CATEGORY 2 VERIFICATION ERRORS THAT MAY NOT AFFECT WHETHER A LOCATION MEETS CURRENT REMOVAL CRITERIA

Error Description Modification	Number of Affected Verified Parcels	Percent of Verified Parcels	Number of Affected Verified Locations	Percent of Verified Locations
Previously had vermiculite containing insulation in attic	24	9.2	27	1.6
Building type (e.g., garage, shed)	4	1.5	4	0.2
Description of visible vermiculite (e.g., expanded, unexpanded)	15	9	15	1.4
Location Inspection Visit Date	2	0.8	11	0.7
Dust Sample Collected	1	0.4	1	0.1
Extent Attic Finished	10	3.8	11	0.7
Parcel Inspection Date	1	0.4	10	0.6
Location Comment	12	4.6	12	0.7
Use Area Description (e.g., yard, flowbed)	3	1.1	4	0.2
Building Square Footage	37	14.1	61	3.7
Use Area Square Footage	11	4.2	15	0.9
Visible Vermiculite Description	38	14.5	70	4.2
Wood Burning in building	1	0.4	1	0.1
Building Year Of Construction	1	0.4	1	0.1

3.3   HIGH-PROFILE ERROR VERIFICATION

During verification of the 2008 TAPE field data, 5 properties that have VV, but were not identified as such in the Scribe database, were discovered and are defined as high-profile errors. High-profile errors are errors where the presence of vermiculite was misidentified in the database. The errors are summarized in Table 5. In addition, one error, defined as critical, was also identified and shown in Table 5. A critical error is where a parcel status was changed from not meeting any removal criteria to meeting at least one removal criteria.

TABLE 5 HIGH-PROFILE ERRORS			
Property Identification	**Location**	**Sample Number**	**Remarks**
AD-200331*	UA-202215	TT-04753	Logbook notes 20 soil aliquots taken from flower bed. None showed VV, but other low amounts were noted during UA surface inspection. No record of VV is in Scribe database.
AD-202006	BD-202346	TT-09106	Pots with VV in greenhouse noted in logbook, but no record of VV in Scribe database. Parcel has other removal criteria triggers
AD-202004	BD-202228	Not sampled	Logbook noted VV in pump house, but since a dust sample could not be obtained, the VV was not entered into the database. Parcel has other removal criteria triggers.
AD-200614	BD-202048	NA	Logbook notes no VCI in attic, but Scribe database showed VCI in attic. Parcel has other removal criteria triggers.
AD-200438	BD-202310	TT-08875	Logbook notes interior VV on the floor of the building, but no record of VV noted in the Scribe database. Parcel has other removal criteria triggers.
AD-200159	BD-202042	NA	Logbook notes no attic VCI, but Scribe database showed VCI in attic. Parcel has other removal criteria triggers.

Notes:

*   Critical error where parcel status was changed from
         not meeting any removal criteria to meeting at least one removal criteria.
NA   Not applicable
VCI   Vermiculite-containing insulation
VV   Visible vermiculite

4.0   RECOMMENDATIONS

The primary objective of field data verification was to ensure the accuracy and completeness of the field data in the Scribe database and in the electronic data archive. In addition, as errors were identified, data collection and management protocol changes were developed to ensure better accuracy for the subsequent field inspection data.

These protocol changes will be included in Version 3.0 of the DMP; expected in 2009. Examples of protocol changes that came about as a result of field data verification are shown below.

- Maintain data integrity by maintaining relationship rules and instituting additional relationship rules to field handheld computer; examples include the following: 1) If 'Was the building remodeled?' equals NO, then both 'When remodeled' and 'Where remodeled' will equal N/A, 2) If 'Heating source' equals NONE, then 'Heat distribution' equals NONE.

- Perform additional quality assurance and quality control procedures at the end of each field day including daily overview of logbook entries, sketches, point of contact forms, and photographs. In addition, the number of properties, locations, and samples loaded into the database are verified against the field generated Sample Storage Summary Form.

- Add additional values to lookup lists on field handheld computer; lookup lists include 'Sample Variation' and 'Dust Sample Collected?'.

A summary of TAPE verifications statistics for 2008 is shown below:

2008 TAPE Verifications Statistics

2008 Total TAPE Inspections: 262
2008 Full Verifications: 262
2008 Properties Verified where VV was not noted in database (Labeled High-Profile): 1
2008 Percentage of Properties with High-Profile Critical Errors (1 out of 262): 0.4%

Assume an average of 0.5 hours per property at an average labor cost of $100/hour, the 2008 property verifications equal $13,100 for 262 properties.

5.0   REFERENCE

Tetra Tech EM Inc. (Tetra Tech) 2009. "Draft Data Management Plan (Version 2.0) for the Troy Asbestos Property Evaluation Project." February.